Claims

1. A reference mark detector for use with a metrological scale or encoder having a patterned reference mark movable relative to the reference mark detector the detector comprising a detector array for detecting the patterned reference mark, the detector array comprising at least two sets of detector elements each set being formed as a pattern which relates to the pattern of the reference mark.

2. A reference mark detector as claimed in claim 1 wherein each element of each set has an output, each of the outputs from each of the elements of a set is summed with the other elements of the same set, and the summed output from a second of the sets is subtracted from the summed output of a first of the sets.

3. A reference mark detector as claimed in claim 2 wherein the pattern of the first and second set of detectors is irregular.

4. A reference mark detector as claimed in any one of claims 1 to 3, wherein the detector array comprises two rows of elements, the first of the rows containing a first one of the sets of detector elements and the second row containing a second one of the sets of detector elements.

5. A reference mark detector as claimed in claim 4 wherein the first of the rows is displaced relative to

the second of the rows in a direction of movement of the reference mark detector relative to the reference mark in use.

6. A reference mark detector as claimed in claim 1,2 or 3 wherein the detector array comprises a single row, a first set of detector elements and a second set of detector elements comprising detector elements in the row.

7. A reference mark detector as claimed in claim 6 wherein the first set of detector elements are connected together to provide a distinct output when the reference mark is detected in a first position and the second set are connected together to provide a distinct output when the reference mark is detected at a position different to the first position.

8. A reference mark detector as claimed in claim 7 wherein the position of the first and second set of detector elements correspond to positions in a notional table, the first row of the table containing high or low values corresponding to the pattern of the reference mark, the second row of the table containing the same values, the values in the second row being displaced relative to the position in the table of the values of the first row in the direction of the rows, each value from the second row being deducted from the values of the first row immediately above the values of the second row to form a resultant for each position in the table, the position in the table of the positive high values of each resultant representing the positions of the first set of detector elements and the positions in the table of the negative high values of

each resultant representing the positions of second set of detector elements.

9. A reference mark detector as claimed in any one of the preceding claims 3 to 8 when dependent on claim 2 wherein the summing of the outputs and the subtraction of the sums is done digitally.

10. A metrological scale or encoder having periodic markings for incremental measurement operations and a scale reader for determining the displacement of the reader relative to the scale by reading the periodic markings, the scale including a patterned reference mark, the scale reader including a reference mark detector including a detector array, the array comprising at least two sets of detector elements, each set having separately processed outputs and including means for producing a signal from the outputs of the elements having a value which crosses zero when the reference mark is detected by the reference mark detector.

11. A metrological scale or encoder as claimed in claim 10 wherein the means for producing the signal includes summing the outputs of each of the elements in a first set of the said at least two sets to produce a first summed output and summing the output from a second set of the said at least two sets to produce a second summed output, then subtracting the second summed output from the first summed output.

12. A metrological scale or encoder as claimed in claim 10 wherein the array is formed as at least two rows and a first one of the said sets is included in one of

the rows, and a second set is included in an other of the two rows.

13. A metrological scale or encoder as claimed in claim 10 wherein the array is formed as a single row and a first and second set of sets of elements are comprised in the single row.

14. A metrological scale as claimed in any one of claims 10 to 13 wherein the reference mark comprises bits missing or added to the periodic markings of the scale or encoder.